

GEPHE SUMMARY

	Gephebase Gene	GepheID
CYP2J19 (<a +cyp2j19+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+CYP2J19+"#gephebase-summary-title)	GP00000202	
	Entry Status	Martin
Published		

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology~#gephebase-summary-title)		Trait Category
Coloration (red vs yellow beak) (https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+Coloration+(red+vs+yellow+beak)^#gephebase-summary-title)		Trait
Taeniopygia guttata	Trait State in Taxon A	
Taeniopygia guttata - yellowbeak	Trait State in Taxon B	
Taxon A	Ancestral State	
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Domesticated~#gephebase-summary-title)	Taxonomic Status	
Taxon A	Taxon B	
Taeniopygia guttata (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Taeniopygia+guttata~#gephebase-summary-title)	Taeniopygia guttata (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Taeniopygia+guttata~#gephebase-summary-title)	
zebra finch	zebra finch	
Poephila guttata; Taeniopygia guttata; zebra finch; Taeniopygia guttata (Vieillot, 1817)	Poephila guttata; Taeniopygia guttata; zebra finch; Taeniopygia guttata (Vieillot, 1817)	
species	species	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Passeriformes; Passeroidea; Estrildidae; Estrildinae; Taeniopygia	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Passeriformes; Passeroidea; Estrildidae; Estrildinae; Taeniopygia	
Taeniopygia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59728)	Taeniopygia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59728)	
59729 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59729)	59729 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59729)	
No is Taxon A an Intraspecies?	No is Taxon B an Intraspecies?	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Homo sapiens
CYP2J2		P51589 (http://www.uniprot.org/uniprot/P51589)
	Synonyms	GenebankID or UniProtKB
CPJ2; CYP11J2		ANH10894 (https://www.ncbi.nlm.nih.gov/nuccore/ANH10894)
	String	
9606.ENSPO0000360247		
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000360247)		
	Sequence Similarities	
Belongs to the cytochrome P450 family.		
	GO - Molecular Function	
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)		
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)		
GO:0004497 : monooxygenase activity		
(https://www.ebi.ac.uk/QuickGO/term/GO:0004497)		
GO:0070330 : aromatase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0070330)		
GO:0016712 : oxidoreductase activity, acting on paired donors, with incorporation or		

reduction of molecular oxygen, reduced flavin or flavoprotein as one donor, and incorporation of one atom of oxygen (<https://www.ebi.ac.uk/QuickGO/term/GO:0016712>)
GO:0008392 : arachidonic acid epoxygenase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008392>)
GO:0008395 : steroid hydroxylase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008395>)
GO:0008405 : arachidonic acid 11,12-epoxygenase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008405>)
GO:0008404 : arachidonic acid 14,15-epoxygenase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008404>)
GO:0071614 : linoleic acid epoxygenase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0071614>)

GO - Biological Process

GO:0055114 : oxidation-reduction process (<https://www.ebi.ac.uk/QuickGO/term/GO:0055114>)
GO:0019373 : epoxygenase P450 pathway (<https://www.ebi.ac.uk/QuickGO/term/GO:0019373>)
GO:0042738 : exogenous drug catabolic process (<https://www.ebi.ac.uk/QuickGO/term/GO:0042738>)
GO:0006805 : xenobiotic metabolic process (<https://www.ebi.ac.uk/QuickGO/term/GO:0006805>)
GO:0006082 : organic acid metabolic process (<https://www.ebi.ac.uk/QuickGO/term/GO:0006082>)
GO:0006690 : icosanoid metabolic process (<https://www.ebi.ac.uk/QuickGO/term/GO:0006690>)
GO:0043651 : linoleic acid metabolic process (<https://www.ebi.ac.uk/QuickGO/term/GO:0043651>)
GO:0008016 : regulation of heart contraction (<https://www.ebi.ac.uk/QuickGO/term/GO:0008016>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0070062 : extracellular exosome (<https://www.ebi.ac.uk/QuickGO/term/GO:0070062>)
GO:0043231 : intracellular membrane-bounded organelle (<https://www.ebi.ac.uk/QuickGO/term/GO:0043231>)
GO:0005789 : endoplasmic reticulum membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)
GO:0031090 : organelle membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0031090>)

	Presumptive Null
Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes~#gephebase-summary-title)	
	Molecular Type
Gene Loss (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Gene Loss~#gephebase-summary-title)	
	Aberration Type
Deletion (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Deletion~#gephebase-summary-title)	
	Deletion Size
10-100 kb	
	Molecular Details of the Mutation
13kb deletion including complete loss of the CYP2J19A copy and cis-regulatory effects on CYP2J19B	
	Experimental Evidence
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	
	Main Reference
Red Carotenoid Coloration in the Zebra Finch Is Controlled by a Cytochrome P450 Gene Cluster. (2016) (https://pubmed.ncbi.nlm.nih.gov/27212402)	
	Authors
Mundy NI; Stapley J; Bennison C; Tucker R; Twyman H; Kim KW; Burke T; Birkhead TR; Andersson S; Slate J	

Abstract

Bright-red colors in vertebrates are commonly involved in sexual, social, and interspecific signaling [1-8] and are largely produced by ketocarotenoid pigments. In land birds, ketocarotenoids such as astaxanthin are usually metabolically derived via ketolation of dietary yellow carotenoids [9, 10]. However, the molecular basis of this gene-environment mechanism has remained obscure. Here we use the yellowbeak mutation in the zebra finch (*Taeniopygia guttata*) to investigate the genetic basis of red coloration. Wild-type ketocarotenoids were absent in the beak and tarsus of yellowbeak birds. The yellowbeak mutation mapped to chromosome 8, close to a cluster of cytochrome P450 loci (CYP2J2-like) that are candidates for carotenoid ketolases. The wild-type zebra finch genome was found to have three intact genes in this cluster: CYP2J19A, CYP2J19B, and CYP2J40. In yellowbeak, there are multiple mutations: loss of a complete CYP2J19 gene, a modified remaining CYP2J19 gene (CYP2J19(yb)), and a non-synonymous SNP in CYP2J40. In wild-type birds, CYP2J19 loci are expressed in ketocarotenoid-containing tissues: CYP2J19A only in the retina and CYP2J19B in the beak and tarsus and to a variable extent in the retina. In contrast, expression of CYP2J19(yb) is barely detectable in the beak of yellowbeak birds. CYP2J40 has broad tissue expression and shows no differences between wild-type and yellowbeak. Our results indicate that CYP2J19 genes are strong candidates for the carotenoid ketolase and imply that ketolation occurs in the integument in zebra finches. Since cytochrome P450 enzymes include key detoxification enzymes, our results raise the intriguing possibility that red coloration may be an honest signal of detoxification ability.

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Additional References

RELATED GEPHE

	Related Genes
No matches found.	
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No matches found.	

EXTERNAL LINKS

COMMENTS